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ABSTRACT

This paper explores the transition from school to young adulthood of youth with disabilities from the first wave (n=939) of the National Longitudinal Transition Study (NLTS). Two popular sociological perspectives which explain the postschool success of youth with disabilities were examined: human capital in the form of education and training, and structural factors such as family and community background. Seven latent constructs were identified as generally representing either of the conceptual orientations, their combination, or postschool success and were reflected in a number of measured variables. These seven constructs include: Community Thrive, Family Thrive, School Thrive, School Programs, Academic Difficulty, Individual Aptitude, and Postschool Success. Results suggested that both structural and human capital constructs significantly relate to postschool success. However, the relative importance of the two types of factors varied by disability. For example, Family Thrive related to all disability groups similarly with the exception of mental retardation, while School Programs generally favored youth with learning disabilities and sensory impairments. An appendix offers background information on the NLTS sample. (Contains approximately 80 references.) (JDD)

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HUMAN CAPITAL AND STRUCTURAL EXPLANATIONS OF POST-SCHOOL SUCCESS FOR YOUTH WITH DISABILITIES: A LATENT VARIABLE EXPLORATION OF THE NATIONAL LONGITUDINAL TRANSITION STUDY

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Prepared for presentation to Special Education SIG,
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Running Head: POST-SCHOOL SUCCESS

Abstract

This paper describes an exploration of the transition from school to young adulthood of youth with disabilities from the first wave of the National Longitudinal Transition Study (NLTS). The strengths of NLTS allowed the examination of two popular sociological perspectives to explain the postschool success of youth with disabilities: 1) human capital in the form of education and training; and 2) structural factors such as family and community background. Seven latent constructs -- *Community Thrive*, *Family Thrive*, *School Thrive*, *School Programs*, *Academic Difficulty*, *Individual Aptitude* and *Postschool Success* -- were identified as generally representing either of the conceptual orientations, their combination, or postschool success and were reflected in a number of measured variables. Further, we hypothesized the relationships among these latent constructs might differ for youth in different disability categories. Results suggested that both structural and human capital constructs significantly relate to *Postschool Success*. However, the relative importance of the two types of factors varied by disability. Implications for practice and further research are discussed.

Human Capital and Structural Explanations of Post-school Success for Youth with Disabilities: A Latent Variable Exploration of the National Longitudinal Transition Study

American society now expects more from its educational system than it has at any time since the inception of public education in the nineteenth century (Doyle, 1992; Kretovics, Farber, & Armaline, 1991). Schools are being required to provide concrete evidence of their effectiveness. In addition to shorter-term outcomes related to student achievement, attendance, and improved quality of instruction, outcomes regarding the success of youth after they leave the formal education system are increasingly viewed as legitimate indicators of how the schools are doing (DeStefano & Wagner, 1991). The policy paper "America 2000" codifies this new thinking with a broad range of national education goals to be reached before the turn of the century (U.S. Department of Education, 1991).

As the ultimate impact of P.L. 94-142 is assessed, many researchers and policy-makers in special education have been involved in this focus on post-school outcomes for special education students for over a decade. The results of this body of research paint a troubling picture for youth with disabilities once they leave secondary school: 1) Youth with disabilities fail to complete secondary school at rates comparable to peers in the general population (Blackorby, Edgar, & Kortering, 1987; Blackorby, Edgar, & Kortering, 1991; Kortering & Blackorby, 1992; Lichtenstein, in press; Wagner, 1991); 2) Youth with disabilities are often employed at rates that are low compared to youth in the general population (D'Amico, 1991); 3) Employed youth tend to hold low-wage, low-status jobs with low prospects for advancement (Affleck, Edgar, Levine, & Kortering, 1990; Edgar, 1987; Edgar, Levine, Levine, & Dubey, 1987; Hasazi, Gordon, & Roe, 1985; Mithaug, Horiuchi, & Fanning, 1985; Sitlington & Frank, 1990; Wagner, 1991); 4) Relatively few youth with disabilities attain residential independence (Newman, 1991); 5) Many youth with disabilities are "unengaged" in the years following high school—neither working, nor going to school, and living at home (Edgar, 1987; Jay, 1991); 6)

Youth with disabilities have less frequent contact with friends than do peers in the general population (Faas, D'Alonzo, & White, 1990; Newman, 1991; Scuccimarra & Speece, 1990; Wagner, 1992; Zetlin, 1987; Zetlin & Murtaugh, 1988)..

These findings vary by disability category and by demographic characteristics. For example, on most measures, youth with learning disabilities most resemble the general population whereas youth with emotional disturbances, mental retardation, and multiple disabilities appear to do less well. Further, males with disabilities consistently experience more labor market success—both in rates of employment and wages—than their female peers (Hasazi et al., 1985; Mithaug et al., 1985, Sitlington & Frank, 1990; Wagner, 1990). Geographic location and length of time since school exit also seem to influence employment outcomes. Finally, even when working, relatively few youth with disabilities earn incomes sufficient to live independently (Affleck et al., 1990; Edgar, 1987; Hasazi et al., 1985; Mithaug et al., 1985; Sitlington & Frank, 1990; Wagner et al., 1990). In only a single study (Kranstover, Thurlow, & Bruninks, 1989) were most of the former students earning wages sufficient for independent living.

Although some of these data are quite consistent across studies, those factors identified as being related to positive outcomes have been far less uniform. In one study, for example, the self-family-friend network and paid work experience during high school were important in postschool job acquisition (e.g., Hasazi et al., 1985). In several others, they were not (Edgar, Levine, Levine, & Dubey, 1988; Mithaug et al., 1985). Some studies support participation in vocational education (Gill & Edgar, 1990; Wagner, 1991) or the importance of socioeconomic status, while others do not (Blackorby, 1991). It follows, then, that interpretations reached from follow-up data have been quite divergent. Investigators can find justification for viewing similar data either positively (Mithaug et al., 1985; Wagner, 1990) or negatively (Sitlington, & Frank, 1990; Affleck et al., 1991). This divergence also is manifested in the suggested directions for change. Some investigators recommend increased emphasis on vocational

education (Edgar, 1987; Schalock et al., 1985), paid work while in high school (Hasazi et al., 1985), and better coordination between schools and postschool social service agencies (Benz & Halpern, 1987). Others advocate a broader umbrella of services both before and after high school graduation (Affleck, Edgar, Levine, & Kortering, 1991; Siegel, Robert, Greener, Meyer, Halloran, & Gaylord-Ross, 1993).

Some Limitations of the Follow-up Literature and the Current Investigation

The body of research on the postschool success of youth with disabilities has grown significantly over the last decade. During the same time period, the research has become integrally linked with the evolving field of transition services, which now offers innovative program options such as effective interagency collaboration, supported work programs (Chadsey-Rusch, Rusch, & O'Reilly; 1991), and new concepts in service delivery (Siegel, 1988; Siegel, Avoke, Paul, Robert, Gaylord-Ross, 1991). Nonetheless, there are several technical limitations of local and state level studies, both with respect to sample size and analytical approach, that limit the field's ability to test general hypotheses about the effects of special education experiences on youths' postschool lives and how those might vary across different disability categories (Blackorby & Edgar, 1992; Halpern, 1990). In this investigation, we hope to employ the strengths of the National Longitudinal Transition Study (NLTS) to explore a general model of postschool success driven by sociological theory and to test the suitability of that model for youth in different disability categories.

Conceptual Orientation: Schooling, Occupational Attainment, and Wages

Sociologists and economists have long been interested in the relationship between schooling and subsequent labor market success. In general, research suggests that the total amount of education (usually measured in years, but sometimes by degree) is positively correlated with earnings, as well as the prestige of occupation (Hauser, & Daymont, 1977; Jencks et al., 1979; Sewell, Hauser, & Wolf, 1980; Snyder, 1969). One popular perspective used to explain this correlation is "human capital theory" (Becker, 1975; Welsh, 1975). In its

most basic formulation, human capital theory posits that education and training produce a host of specific and general skills or attributes, which subsequently have some value in the labor market. Thus, the employment rates associated with any particular group are an indirect measure of the market value of the skills of that group. Should one wish to change an individual's or a group's occupational/financial status, human capital theorists have a relatively simple solution: increased investment in those individuals should increase the market value of their skills. Special education represents a considerable investment in individuals with disabilities, somewhere between two and three times that in individuals without disabilities. It operates, however, generally as a human capital notion: Educational investment, with the expectation of improved outcomes, is made primarily in the individuals with disabilities, with little attention to the potential confounds of market or other societal forces (Skrtic, 1987).

The general opposing view may be characterized by the "structural" theory. Structuralists do not explicitly refute the tenets of human capital theory, but they do take a somewhat different view of the role of schools and the labor market. They argue that structural elements of the economy as well as discrimination, based largely on social class, powerfully influence earnings and status (Bowles, & Gintis, 1976; Carrier, 1984; Levin, 1983). First, unemployment rates are an inherent feature of a market economy like the United States. Thus, if investment in the skills of a particular group is not accompanied by the generation of additional employment opportunities, it will have the effect of displacing other groups (Levin, 1980). Second, they argue that individuals' social class is the primary determinant of eventual earnings and status (Bowles & Gintis, 1976).

The available evidence comparing the human capital and structural explanations does not present an either-or situation. For example, Jencks et al. (1979) found that educational attainment and achievement predicted earnings and status within a given social class, but did so less well across classes. There are no such studies which specifically address this issue

for people with disabilities. The structural and human capital references here are not intended to preclude or exclude other viable approaches; they are included as possible analytical tools for understanding the variability in postschool outcomes for individuals with disabilities.

Advantages of the Technical Approach

There have been a number of criticisms of follow-up research that this current investigation seeks to address: First, there has been an overemphasis on employment at the expense of other important postschool outcomes, such as community adjustment or general quality of life (See, for example, Cameto, 1990; Edgar, 1987a; Halpern, 1990; Schalock, 1990). Halpern (1992) found no correlation between community functioning and measures of employment success. Second, most studies have examined the outcome domains of employment, postsecondary schooling, independent living, and social adjustment as separate entities.

However, individual lives do not apportion themselves neatly into such categories—clearly, the different facets of an individual's life interact in complex ways. Composite measures of success in young adulthood seem more relevant. For example, Sitlington and Frank (1989, 1990) have taken a novel approach to the problem in their investigation of the postschool success of youth with disabilities in the state of Iowa. This study employed two composite criteria to measure postschool success combining employment, living situation, a financial independence. Two sets of criteria resulted in 2% and 7% of former students with mental disabilities and 33% and 54% of those with learning disabilities were considered successful, respectively. Siegel and Gaylord-Ross (1991) used a triangulated survey and constant comparative analysis (Glaser & Strauss, 1967) to test for correlations between four factors (social acceptance on the job, job match and accommodation, special services, and work self-rationalization) and vocational success. The NLTS (described in more detail below) contribution to these efforts resulted in six profiles of postschool success (Wagner, 1992). These analyses suggested that half of individuals with disabilities attained the most

independent profiles and that there was a general trend toward greater independence over time. For example, 20 percent and 43 percent of youth were independent in three domains and two domains by the time they had been out of school three to five years (Wagner, 1992).

The National Longitudinal Transition Study of Youth with Disabilities

In response to a general lack of comprehensive data related to transition on the national level, the Office of Special Education Programs (OSEP) contracted with SRI International to conduct the National Longitudinal Transition Study (NLTS) (Wagner, Newman, D'Amico, Jay, Butler-Nalin, Marder, & Cox, 1991). This national study consists of a randomly selected representative sample of 8,000 youth with disabilities diagnosed in all 11 disability categories served under EHA (now IDEA). Data were collected to shed light on the characteristics of youth and families served under the EHA, their educational experiences, their social activities, their postschool employment and independence, and their use of adult services. The NLTS is guided by a conceptual model that states that individual characteristics, school characteristics, and family characteristics all contribute to the postschool status of youth with disabilities.

The NLTS has already provided the field with much needed descriptive and explanatory information regarding secondary School Programs and performance (Wagner, 1991), residential independence (Newman, 1991), employment (D'Amico, 1991; D'Amico & Marder, 1991), and dropping out (Wagner, 1991a; Wagner 1991b) as well as trends in those outcomes (Wagner, D'Amico, Marder, Newman, & Blackorby, 1992).

The NLTS is a large database designed to generalize to the national population of youth with disabilities. It is comprised of a series of different data collection protocols, including telephone surveys, school content forms, teacher surveys, transcript analyses, and school abstracts. It is ideal for large scale conceptual questions such the relative contribution of school versus family and community background to postschool success. As a large scale database, it cannot, however, contain many factors which could be instrumental in youths' educational and postschool experiences. For example, we cannot comment on the quality of

either academic or vocational programs, or employment experiences. On the other hand, it is the only national database that has a sufficient sample—particularly in low incidence disability categories—for a conceptual question of the relative importance of school or community characteristics in light of disability.

Method

The present investigation seeks to accomplish a task similar to the "six profile" study (Wagner, 1992), but through somewhat different means. Previous attempts created criteria for success through a logic process. Our approach employs a statistical combination of variables that are a result of several latent or underlying factors. One advantage of this approach is that the underlying construct can be thought of as being more stable than any of the measured variables alone or in combination with one another. We have hypothesized seven latent constructs, among which associations will be investigated: *Community Thrive*, *School Thrive*, students' *School Programs*, students' *Academic Difficulty*, *Family Thrive*, *Individual Aptitude*, and *Postschool Success*. The correlations among these constructs lend support to the human capital view of adult success, the structural view, or some combination thereof. Also included are correlations representing variation in those relationships across disability category.

Participants

The participants included in this investigation are 939 individuals who, at the completion of the first wave of data collection of the NLTS, had both in-school as well as postschool data available for them. Their demographic characteristics are included in Table 1. Several disability groups have been combined into single groups for sample size reasons. That is, deaf youth, blind youth and deaf/blind youth have been combined into a single group we have called sensory disabilities. Orthopedically impaired youth, health impaired youth have similarly been combined into a group called physical disabilities. These two groups represent 33 and 18 percent of the sample, respectively. Their peers with learning disabilities, mental

retardation, or emotional disturbances account for 22 percent, 16 percent, and 11 percent of the sample, respectively.

Insert Table 1 about here

Latent and measured variables

Summaries of descriptive statistics of the measured variables relating to the underlying constructs are included in Table 2. A brief discussion of the latent factors follows:

Insert Table 2 about here

Community Thrive. This latent construct is reflected in five measured variables: total enrollment in the youth's school district, the average daily attendance for the youth's school (which serves the immediate community), the unemployment rate in the youth's county of residence in 1987, the urbanity of the community, and the average wage level in the community in 1987. This latent construct derives from the view that a community's size, setting, and prevailing economic conditions all relate to the types of problems that the community is likely to face and the resources it can bring to bear to solve them. There is ample research to support the notion that urban and suburban communities face different problems in several arenas (e.g., crime and unemployment) that in part impact the nature of schools and other services in a community (Hess, 1986; Pallas, Natriello, & McDill, 1989). Wealthier communities, in turn, may have greater resources at their disposal to tackle their problems (Farber & Lewis, 1972).

School Thrive. Of primary importance in this investigation is the nature of schools, and their influence on youths' educational experiences and chances for postschool success. This latent construct is reflected in four measured variables: average daily attendance at youth's

school, the presence of compensatory education programs at the school, the proportion of the student population from low income backgrounds, and the proportion of the student population that receives special education services. Schools in many ways reflect the community that they serve. The diversity of the school's population and its size often influence the curriculum and programs that are offered students. For example, small schools may not offer a broad curriculum but may be supportive environments that are more attentive to the individual needs of students (Biniaminow & Gleason, 1983).

Students' School Programs. This construct is probably the most critical one under investigation here. The actual programs that are delivered to students are also the area most amenable to intervention and change. It is reflected in the following measured variables: whether students took academic classes in regular education settings, the percentage of students' time spent in mainstreamed settings, whether students received tutoring or other academic support, whether students received instruction in occupational therapy / life skills, and whether students had vocational education courses in school.

These areas reflect critical domains of debate both in the transition literature as well as in special education as a whole (See Anderegg & Vergasson, 1988; Kaufmann, 1991). The Regular Education Initiative and the Full Inclusion movement both make an issue of placement in integrated settings (Jenkins, Pious, & Peterson, 1988; Jenkins, Pious, & Jewell, 1990). Some research has suggested that these arrangements produce academic achievement that is at least equal to that achieved in traditional resource room or self-contained programs (Carlberg & Kavale, 1980). It is important to note that the vast majority of this research has focused on elementary school children. The application of these principles to secondary school is a matter of debate. Indeed, the NLTS has found that most students with disabilities spend the majority of the class time in regular education settings (Wagner, 1991).

Students' Academic Difficulty. This latent factor is reflected in measured variables of whether or not students failed a class, how often students were absent from school, whether or

not students were suspended, whether or not the students had disciplinary problems in school, and grade point average. The importance of such a factor is well established. Disappointment in the school achievement of American students was one of the catalysts behind the educational reform movements of the 1980s (Knapp & Shields, 1990). In addition, a vast body of educational research links school performance to a host of positive adult outcomes including employment, wages, and even psychological well-being (Wehlage, 1989; Wentzel, 1987; Willits, 1988).

This latent factor is intended to represent school performance broadly. It is intended to reflect the degree to which students have completed their course objectives. However, it is also intended to reflect the degree of a bond between the student and the school. Previous NLTS findings, for example, have shown that students who are frequently absent and failed one or more classes are also more likely to drop out of school which results in reduced post-school opportunities (Wagner, 1991; Zigmond & Thornton, 1988).

Family Thrive. This latent construct is reflected in the following six measured variables: parental employment status, family income, parental education level, number of parents living in the household, number of children in the household, and use of public assistance. This construct is pivotal to the model under question. Various formulations of family background (e.g., education level, income, occupational prestige) have been linked to school achievement as well as postschool measures (Johnson & Stafford, 1973; Palla, Natriello, McDill, 1989; Rumberger, 1983; Wilson, 1987). A structural explanation of postschool success would view this construct as the primary determining factor of success after school.

Individual Aptitude. Each individual regardless of background brings a host scholastic, work-related, and social skills to bear on the tasks of life. This construct does not represent a full range of student abilities. Instead, it is a more limited perspective that is reflected in students' intelligence and their ability to perform self care types of tasks. While limited, these capabilities often relate to students' ability to perform a host of other tasks competently. The

observed variables described by this construct are scales of the student's intellectual ability and self-care ability.

Postschool Success. This latent factor is reflected in several postschool outcomes that are typically viewed individually: employment status, postsecondary education, wages, independent living status, degree of social interaction, and having trouble with the law. Youths' postschool employment has been the dominant outcome measure for most of the transition literature. This single outcome has been criticized for being too restrictive. Previous NLTS efforts created 6 logically created profiles of postschool success (Wagner, 1992). The current approach similarly tries to assess these factors in light of a single underlying factor.

Disability. Dichotomous variables representing learning disability, mental retardation, emotional disturbance, sensory disability, and physical disability were created. The relationship of these conditions with the seven constructs is investigated.

Control variable. The influence of sex was controlled statistically by partialing its effects from the data. Ideally, separate models for males and females could be constructed and tested for differences; however, due to the large size of the model, it was necessary to partial the influence of sex out rather than include it directly in the model. As a result, the findings of this study are not distorted by linear sex-related effects among the variables.

Analyses

The general theme of this exploratory investigation is the relative contribution of school-related (i.e., human capital) factors and community and family background factors (i.e., structural) on the postschool success of youth with disabilities. In addition to exploring this general model, we investigate the degree to which this model fits differently, either in magnitude or direction, for youth from different disability groups.

The process taken was in two-steps. First, the EQS program (Bentler, 1986) was used to conduct a maximum-likelihood estimation of the associations between measured variables and their factors, as well as among all seven factors That is, paths were included from each

factor to its defining observed variables, and all factors were all allowed to correlate freely. Second, five dichotomous handicapping condition variables were included in the model, allowing them to correlate freely with all latent constructs. These dichotomous variables represent the disabilities of learning disability, mental retardation, emotional disturbance, sensory disability, and physical disability. Ideally, different models would be built for groups of participants with different disabilities; unfortunately, small samples in some conditions made such an approach ill-advised.

Results

Correlated Factor Analysis Model

Measurement model. The overall fit of the measurement model, how well observed variables define their constructs, appears poor given the chi-square goodness-of-fit value (χ^2=2973.015, 443 df, p<.001). This is not surprising because the sample size is very large, and because no paths or correlated residuals were added to improve the model's fit. The standardized path coefficients of all observed variables on their respective factors appear in Table 3.

Insert Table 3 about here

From an examination of the significant paths, and the signs of those paths, the interpretation of each construct may be clarified. *Community Thrive* appears to represent the degree of urbanity and prosperity of a given community, while *School Thrive* is indicated strongly by the absence of special education youths in the school. *Student's School Programs* is best represented by the degree to which the student was involved in regular education; having a tutor or taking vocational education classes did not contribute to this construct. *Student's Academic Difficulty* is so defined because of positive paths to

suspension, days absent, course failure, and behavior problems, and because of a negative path to GPA. *Family Thrive* is generally indicated by more employment, more income, more parental education, fewer children and receipt of fewer services. *Individual Aptitude* is strongly indicated by the student's intellectual and self-care abilities, while *Postschool Success* is positively defined by all significantly contributing variables.

Interfactor correlations. The associations of all seven constructs appear in Table 4.

Insert Table 4 about here

Most factors have significant correlations among them. Notable exceptions involve the *Community Thrive* construct, which failed to be associated with the *Student's School Programs, Student's Academic Difficulty, Family Thrive,* and *Individual Aptitude.* Non-significant relationships were also noted for the *Student's Academic Difficulty,* which, in addition to *Community Thrive,* was surprisingly uncorrelated with *Individual Aptitude* and *Postschool Success.*

Correlated Factor Analysis Model with Handicapping Condition Variables

The correlations of the five handicapping condition variables with all seven constructs appear in Table 5. Given that the sample consists only of individuals with one of the five disabilities, interpretation of the correlations must be made cautiously. A significant positive correlation indicates that individuals with the disability in question are associated with a greater amount of the given construct than those with the other disabilities. A significant negative correlation indicates that individuals with the disability in question are associated with a lesser amount of the given construct than those with the other disabilities. A nonsignificant correlation indicates that overall, these individuals do not differ from those with other disabilities on a given construct. This is not to say they don't differ from specific other

disability groups, but that when summing individuals over other disabilities they do not differ as a whole.

Insert Table 5 about here

Learning disability. From the correlations we notice that a learning disability tends to be more associated than other disabilities with less prosperous community environments, but more thriving school environments with more regular education opportunities. Students with learning disabilities also tended to show more *Individual Aptitude* and more *Postschool Success* than those with other disabilities. Interestingly, they did not differ from individuals summed over other disabilities in terms of their family background or their academic difficulties.

Mental retardation. Individuals with mental retardation had significant and negative associations with all constructs except for *Academic Difficulty*, with which no significant relationship was observed. That is, more than individuals with other disabilities they tended to be from less prosperous communities, and in smaller schools with fewer regular education opportunities. They tended to be from comparatively less thriving families, show less *Individual Aptitude* and experience less *Postschool Success.*

Emotional disturbance. Students emotional disturbances did not differ from students with other disabilities in terms of community, school, or family constructs. Significant positive associations were observed, however, with *Academic Difficulty*, *Individual Aptitude*, and *Postschool Success.* In other words, students with emotional disturbances tended to experience more *Academic Difficulty* than those with other disabilities; but are characterized with more *Individual Aptitude* and more *Postschool Success.*

Sensory disability. Correlations of this dichotomous variable with the seven constructs indicate a general tendency among youths with sensory disabilities to come from more thriving

families and communities, and schools with more regular education opportunities. They also tend to have more *Individual Aptitude* and less *Academic Difficulty* than people with other disabilities. Most interestingly, though, is that they do not differ from other disability groups as a whole in terms of *Postschool Success.*

Physical disability. Analyses indicate that students with physical disabilities tend to be associated with more prosperous communities, but with smaller schools having fewer regular education opportunities. Such students also show significantly lower *Individual Aptitude* and *Postschool Success.* No overall relationship was found with *Academic Difficulty* or *Family Thrive* as compared to all other disabilities combined.

Discussion

A Typology and Uses of Follow-up Research

Follow-up and follow-along studies can be conducted from three general perspectives that produce different kinds of information applicable to different types of questions. The first, of which the NLTS is the best example, is a survey or related approach designed to track youth experiences and outcomes in light of their social cost -- in short, the human capital perspective. That is, based on quantifiable factors such as income, ethnicity, program participation, disability status, etc., what demographic, educational, and sociological conditions correlate with each other and with economic independence? As the measures and analysis become more sophisticated, some answers as to whether the provision of specific services to specifically described groups enhance the likelihood of economic independence may be discovered. In a best-case scenario, such studies exhibit calculations to show that costs associated with disengagement such as welfare, incarceration, rehabilitation, social security, etc., had been decreased by the efficacy of educational and other cost-contained services—that certain specific expenditures were ultimately cost-effective and of economic benefit to the individual and society as a whole.

The second type of study, one that is initially ethnographic, uses the testimony of the individual and the individual's sense of value as the basis of proof. This type of study, to date still best exemplified by the work of Robert Edgerton and his colleagues (Edgerton, 1967, 1984), and being pursued by Halpern (1992) is the superior means for ascertaining reliable and valid measures of quality of life.

A third type of study can serve to directly address the quality-of-life findings of the second type of study, and validate those of the first, such that positive outcomes of the first type of study will more closely correspond to reports of high quality of life in the second. This third type of study is one where the follow-along research is tied to the evaluation and continuous improvement of a particular agency or service model on the local level. The development of multiple studies in this realm could serve to validate particular interventions and service models. For example, a particular curriculum, a particular model of supported employment, a specific vocational or work experience program could be similarly evaluated in multiple sites around the country, against meaningful baselines provided by the NLTS or other master databases. From the macro perspective of the NLTS or any other survey, terms like "vocational education," "supported employment," or "academics in regular education placement" are simplified representations of divergent experiences. As aggregate measures, such groupings are statistically necessary, but can be difficult to interpret. However, the follow-along/program evaluation study allows for the flow of qualitative data into the development of the measures, as the study is conducted in the context of ongoing contact with participants. Thus, as services are shaped to the needs of the individual, quantitative measures delineating a pattern of service delivery can more accurately measure cost-effectiveness and approach a real relationship to expert (participant) testimony on quality of life.

Each of the three approaches has strengths and limitations. For example, studies of the first type must measure quality of life based on dichotomous or scaled responses to queries on

number of friends, social activities, etc. In design or analysis, important value judgments must then be made that may or may not have validity. For example, some studies might need to rightly or wrongly presume that independent living is always a more positive outcome than living with parents - a value judgment. Quality-of-life issues beyond economic prosperity and independence from government-funded services cannot be unequivocally measured by such studies. Studies of the second and third type are able to be more flexible in their treatment of value-oriented issues, through ongoing contact with participants.

This discussion was intended to illustrate the possibilities associated with different research designs. Clearly, the pursuit of any of the three types of studies provides some knowledge and insight as well as opportunities for comparison to the other two. In this exploration, we have utilized the strengths of the NLTS which allows us to address some basic conceptual questions with sociological significance along the lines of what underlying factors are related to better outcomes. While we cannot state specifically which curricula or instructional approaches best relate to postschool success -- that is the domain of the other two types of studies - we can test the applicability of sociological theories and address the relative degree to which *School Programs* and family background impact *Postschool Success*.

Caveats and Indicators of Complexity

There are two specific caveats that the reader must keep in mind in her consideration of our results. First, the model of latent constructs did not fit the data terribly well. This may well be due to the large sample size. However, it may also be an indicator of our level of sophistication. Both technically and conceptually, the NLTS measurement protocol represent the best practices in follow-up research and survey design. Yet the model failed to fit the data. This indicates that the particular constructs we have chosen may not be the best ones that could have been picked. Also, it is important the reader not generalize these findings to other NLTS findings which have addressed the direct effects between measured variables. This problem applies to our particular approach to this concept. However, rather than bemoan the

state of social science, we believe that the model fit is illustrative of a complexity of related issues to growing up that do not lend easily themselves to "if-then" types of answers. If-then answers would be comforting: for a youth of certain characteristics - plus a program with certain characteristics will definitively result in a positive quality of life. We know that the world is not that predictable for anyone. There are youth with and without disabilities who come from non-ideal backgrounds, receive mediocre education, and still achieve success as adults. Second, the NLTS has no comparison group of nondisabled participants. Thus our data-based statements regarding the relationships of specific factors and disability groups are constrained to the population of individuals with disabilities. That is, the finding that mental retardation is associated with less thriving communities indicates that this is so in comparison to other individuals with disabilities. Differences or similarities to similar work in the general population can only be inferred.

Viability of the Latent Constructs

Despite the model fit, the relationship between the measured variables and the underlying constructs (e.g. *Family Thrive*, *Community Thrive*) were logical in nearly all instances. For example, *Family Thrive* appeared reasonably well reflected in household income, size; *Community Thrive* was well reflected in the unemployment rate, wage levels etc. There were two exceptions to this observation. First, tutoring and vocational education were negligibly reflected in the *School Programs* latent construct. This is surprising since both of those measured variables have been found to have independent effects on a host of in-school and post-school measures (Wagner, 1991). Thus, in this exploration, the *School Programs* latent construct can be most accurately interpreted as the amount of time youth spent in regular education settings. This may constitute an argument for two separate factors in future efforts: A integration factor and an coursetaking factor. Second, *School Thrive* was negatively correlated with the number of students in special education programs. There are a number of possible interpretations, none of which we can commit to on the basis of this investigation, but

readers can consider whether this finding indicates negative attitudes and inabilities of schools to successfully manage the diversity students with disabilities offer, poor special education programs, or an as yet undiscovered cause.

Human Capital vs. Structural Explanations of Postschool Success

From this exploration, we find that latent constructs that can be characterized as human capital or structural factors both correlate with the postschool experiences of individuals with disabilities. Indeed, each of the six latent constructs with the exception of *Academic Difficulty* were significantly related to the latent construct representing *Postschool Success*. There are some intriguing aspects among the factors' interrelationships which further preclude "if-then" types of conclusions. For example, the latent construct *Individual Aptitude* correlated most highly with the postschool construct, which is congruent with other results (Blackorby, 1991). However, *Individual Aptitude* is not easily interpreted from solely the human capital or structural positions. That is, an individual's aptitude is most likely a result of a host of factors, among them structural (i.e. family background) and human capital (i.e. education until the time of the survey). Thus, this latent construct's comparatively high correlation with *Postschool Success* can support both conceptual orientations.

The latent construct *Family Thrive* correlates with the postschool construct to nearly the same degree as *Individual Aptitude*. This tends to support the structural position view that adult outcomes are a function of family and class background. On the other hand, *School Thrive* and *School Programs* also achieved high correlations with the postschool construct. These constructs quite clearly represent the human capital position. So, the pattern of relatively complex relationships among the latent constructs indicates clearly that both human capital and structural factors impact the experience of youth with disabilities once they leave secondary schooling.

As is often the case in social science, we were surprised by the absence of certain relationships that we hypothesized would exist. First, particularly striking is the comparatively

weak relationship between the construct *Community Thrive* with the *Postschool Success* construct, and nearly all of the other latent constructs. Although less thriving communities are negatively related to *Postschool Success*, the pattern of correlations does not support the notion that the community substantially relates to the kinds of schools or programs that youth are offered. Thus, the relative prosperity of the community has an impact after school, while having a relatively small one during school. Second, we were surprised that the latent construct representing *Academic Difficulty* was only weakly related to *School Thrive* and *School Programs* and failed to correlate significantly with *Postschool Success*. In addition, it was strongly and negatively related to *Family Thrive* and comparatively unrelated to *Individual Aptitude*. This finding stands in opposition to the common-sense view that those who do better in school are also more likely to achieve success later. It may be that youths' programs themselves may be more important than youth performance in those programs when it comes to a general notion of *Postschool Success*.

Disability and the Latent Constructs

The variation among youth from the disability groups lends credence to the notion that disability itself is an arbitrary grouping of otherwise unrelated individuals, whose primary commonalty is the mainstream's inability to accommodate them (Skrtic, 1987). To this end, analysis of the individuals from the disability groups as discrete groups is valuable.

Some findings from this exploration support previous NLTS findings as well as the work of other researchers. For example, both in and out-of-school, youth with learning disabilities tend to be associated with better outcomes in comparison to their peers in other disability categories, while youth with mental retardation and physical disabilities do relatively speaking worse (Affleck, et al, 1990; Wagner, 1991; 1992). Similarly, youth with emotional disturbances are most highly associated with problems in school while their peers with sensory impairments are associated with less *Academic Difficulty* (Wagner, 1991). Certain groups with sensory disabilities, i.e., persons who are blind or have low-vision are often considered to be more

successful in postschool outcomes, particularly college, than the other groups considered here. Our analyses do not support this, possibly because deaf-blind individuals, who are seriously impeded, are included in the group.

Several other findings seem novel. It appears that negative associations with a single latent construct makes youth in particular disability groups likely to exhibit negative associations with the other constructs as well - or when it rains, it pours. For example, youth with mental retardation do less well than their peers with other disabilities in virtually every latent construct. Youth with mental retardation were associated with less thriving families and communities than their peers with other disabilities. We were surprised that youth with mental retardation would differ so regularly in the negative direction and on so many dimensions.

Disability's Relation to Human Capital and Structural Orientations

The relationship of the latent constructs to *Postschool Success* varies in light of disability. The particular relationships among structural and human capital factors, as well as their relationship to Postschool *Success*, are different for different groups. For example, *Individual Aptitude* correlates most highly with *Postschool Success*. In turn, youth with learning disabilities, emotional disturbances, or sensory impairments are positively and significantly related to *Individual Aptitude*. On the other hand, their peers with mental retardation or physical disabilities are negatively associated with *Individual Aptitude*. It follows, then, these two groups of young adults are associated with less *Postschool Success* than their peers with other disabilities. However, as discussed above, *Individual Aptitude* is probably a combination of human capital and structural elements so it applies equally across disability category.

Some disability-based associations have a more direct application to the two theoretical perspectives. *Family Thrive* (i.e. structural argument) correlated nearly as strongly with *Postschool Success* as *Individual Aptitude*. Most disability groups were not distinguishable from one another in terms of their association with *Family Thrive*. The lone exception is youth

with mental retardation, whose families were relatively less thriving than other youth with disabilities. Youth with mental retardation, then, would be likely to benefit less from the positive association between *Family Thrive* and *Postschool Success*. Similarly, the *Community Thrive* construct differed widely across the disability groups with learning disabilities and mental retardation being associated with less prosperous communities. In the aggregate, *Community Thrive* was negatively related to *Postschool Success*. It would follow that the groups associated with less thriving communities might be associated with poorer *Postschool Success*. However, this is not uniformly the case, since learning disabilities and mental retardation related to the postschool construct in opposite ways. This is further evidence of the complexity of factors that interact to create postschool success.

The benefits of human capital (i.e. *School Programs*) are greater for some youth than others. For example, youth with learning disabilities and sensory impairments were associated with relatively speaking more integrated programs while peers with mental retardation and physical disabilities were associated with ones that were less so. Again, these latter two groups of young adults were associated with less *Postschool Success*.

Implications

There are a number of interesting implications of this exploration. First, both family background and school-related factors are positively related to postschool success. It stands to reason that interventions or clusters of interventions that help both the youth and their families are more likely to result in better postschool outcomes. This is particularly the case for youth with mental retardation who families appeared to thrive less than their peers with other disabilities. In the particular case of *School Programs*, it seems that increased mainstreamed placements may be related to better postschool outcomes. Again, this would appear to particularly appropriate for youth with mental retardation and physical impairments who correlated negatively with that construct and *Postschool Success*. Thus, the non-optimal postschool success of youth with mental retardation might be addressed as a service delivery

focus. Likewise, the difficulty students with emotional disturbance have in school, and the lack of regular education options for students with physical disabilities are notable conditions deserving policies that can begin to rectify them. However, we are cautious in these statements as they are based on correlations. Therefore, it may be disability or other characteristics of particular youth that make them more likely to receive certain kinds of programs (e.g. lots of time in regular education).

Conclusion

This latent variable exploration of the postschool success among youth with disabilities in light of human capital and structural orientations clearly indicates that the relationships are complex, and that both perspectives positively related to the postschool success of youth with disabilities. They do so, however, differently for youth in different disability groups. For example, a structural factor like *Family Thrive* related to all disability groups similarly with exception of mental retardation. Human capital factors (*School Programs*) generally favored youth with learning disabilities and sensory impairments. It is clearly the combination of factors that results in relatively speaking positive postschool success for youth with learning disabilities and negative ones for their peers with mental retardation. This exploration demonstrated the usefulness of a latent variable approach to address complex school and post-school issues. We believe that this approach holds promise for the field of follow-up and along research, as well as other special education issues. In future versions of this paper, we plan to test a series of competing structural equation models.

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Table 1

Description of Sample

Variable	#	%
Gender		
Male	582	62
Female	357	38
Disability		
Learning Disabilities	207	22
Mental Retardation	148	16
Emotional Disturbances	105	11
Sensory Impairments	307	33
Physical Disabilities	172	18

Table 2

Summary of Variable Characteristics

Latent construct/measured variable	Mean	# Item	Range	SD
Community Thrive				
Number of students enrolled in youth's school district	91,264.00	cont	109 - 918,384	187,114.0
1987 unemployment rate in county where student attends school	7.31	cont	2.55 - 19.6	2.96
Urban/Suburban/Rural district	1.87	3	1 - 3	.77
Average annual earnings for service occupations in student's county	19,174.00	cont	10,330 - 28,742	3,505.86
School Thrive				
Average daily attendance at school student attends	1,186.25	cont	12 - 7,866	800.21
Compensatory education programs available at school	.82	2	0 - 1	.39
Percentage of school's students from low income families	2.29	4	1 - 4	1.03
Percentage of special education students in school	17.86	cont	0 - 100	26.93
Student's School Programs				
Student received occupational therapy/life skills training	.48	2	0 - 1	.50
Student ever had tutoring, a reader, or an interpreter	.47	2	0 - 1	.50
Percentage of time spent in regular education placement *	56.14	cont	0 - 100	37.98
Student had vocational education in school	.86	2	0 - 1	.35
Student took academics in regular education placement *	.57	2	0 - 1	.50
Student's Academic Difficulty				
Student has ever been suspended from secondary school	.11	2	0 - 1	0.32
Student's overall GPA	2.29	5	0 - 4	0.86
Number of days student was absent	13.67	cont	0 - 60	13.46
Student failed any of his/her courses	.20	2	0 - 1	0.4
Student exhibited behavioral problems	.15	2	0 - 1	0.36
Family Thrive				
Head of household employed	.76	2	0 - 1	.42
Number of children living in household	2.33	cont	0 - 15	1.55
Student lives in a one- or a two-parent household	1.66	2	1 - 2	.47
Head of household's education level	2.48	7	1 - 7	1.67
Household income	2.74	4	1 - 4	1.26
Household receives benefits from one or more programs	.51	2	0 - 1	.50
Individual Aptitude				
Student's IQ level	13.87	13	4 - 16	2.94
Student's self-care ability scale	11.30	10	3 - 12	1.71
Postschool Success				
Youth had any postsecondary education	.22	2	0 - 1	.41
Youth's employment status scale	3.18	8	0 - 7	3.11
Youth's hourly wage	1.69	cont	0 - 15	2.28
Youth's residential independence scale	3.17	7	1 - 6	.69
How often youth gets together with friends/family members	3.30	6	0 - 5	1.41
Youth has ever been arrested	.10	2	0 - 1	.30

Table 3

Standardized path coefficients from observed variables to factors

Latent construct measured variables	Standardized paths	p
Community Thrive		
Number of students enrolled in youth's school district	.566	<.001
1987 unemployment rate in county where youth attends school	-.203	<.001
Urban/Suburban/Rural district	-.771	<.001
Average annual earnings for service occupations in youth's county	.557	<.001
School Thrive		
Average daily attendance at school youth attends	.465	<.001
Compensatory education programs available at school	.168	<.001
Percentage of school's students from low income families	-.356	<.001
Percentage of special education students in school	-1.000	<.001
Student's School Programs		
Student received any occupational therapy/life skills training	-.235	<.001
Student ever had tutoring, a reader, or an interpreter	.020	NS
Percentage of time spent in regular education placement	.981	<.001
Student had vocational education in school	-.031	NS
Student took academics in regular education placement	.808	<.001
Student's Academic Difficulty		
Student has ever been suspended from secondary school	.420	<.001
Student's overall GPA	-.857	<.001
Number of days student was absent	.484	<.001
Student failed any of his/her courses	.739	<.001
Student exhibited behavioral problems	.379	<.001
Family Thrive		
Head of household employed	.527	<.001
Number of children living in household	-.100	<.010
Student lives in a one- or a two-parent household	.474	<.001
Head of household's education level	.464	<.001
Household income	.761	<.001
Household receives benefits from one or more programs	-.536	<.001
Individual Aptitude		
Student's IQ level	.814	<.001
Student's self-care ability scale	.652	<.001
Postschool Success		
Youth had any postsecondary education	.087	<.050
Youth's employment status scale	.877	<.001
Youth's hourly wage	.900	<.001
Youth's residential independence scale	.117	<.001
How often youth gets together with friends/family members	.201	<.001
Youth has ever been arrested	.044	NS

Table 4

Correlations among latent constructs

Construct	1	2	3	4	5	6
1. Community Thrive						
2. School Thrive	-.089					
3. Youth's School Programs	.015	.453***				
4. Youth's Academic Difficulty	.006	.079*	.093*			
5. Family Thrive	-.020	.110**	.306***	-.176***		
6. Individual Aptitude	.014	.476***	.549***	.071	.235***	
7. Postschool Success	-.134**	.165***	.270***	-.068	.367***	.415***

*p<.05; **p<.01; ***p<.001

Table 5

Correlations between disabilities and latent constructs

Construct	LD	MR	ED	Sensory	Physical
1. Community Thrive	-.152***	-.238***	-.011	.221***	.131***
2. School Thrive	.100**	-.141***	.008	.083**	-.164***
3. Youth's School Programs	.108***	-.300***	.031	.191***	-.082**
4. Youth's Academic Difficulty	.049	-.053	.227***	-.116**	-.053
5. Family Thrive	.071	-.206***	.064	.085*	-.018
6. Individual Aptitude	.207***	-.247***	.179***	.159***	-.226***
7. Postschool Success	.191***	-.128***	.087**	.018	-.171***

*p<.05, **p<.01; ***p<.001

Appendix A
BACKGROUND INFORMATION ON THE NLTS SAMPLE

This appendix provides somewhat greater detail on several methodological aspects of the NLTS, including:

- Data collection components.
- Sampling of districts, schools, and students.
- Weighting of NLTS data.
- Estimation and use of standard errors.
- Construction of comparison groups from the general population using the National Longitudinal Survey of Youth (U.S. Department of Labor).

Components of the NLTS

The NLTS has several components:

- ***The Parent/Youth Survey.*** In the summer and fall of 1987, parents were interviewed by telephone to determine information on family background and expectations for the youth in the sample, characteristics of the youth, experiences with special services, the youths' educational attainments (including postsecondary education), employment experiences, and measures of social integration. Parents rather than youth were selected as respondents for the first wave of data collection because of the need for family background information and because, with most students still being in secondary school and living at home, parents were believed to be accurate respondents for the issues addressed. The survey was repeated in 1990, when youth were interviewed if they were able to respond.
- ***School Records.*** In 1987 information was abstracted from students' school records for the most recent year in secondary school (either the 1985-86 or 1986-87 school year). This information related to courses taken, grades received (if in a graded program), placement, related services received from the school, status at the end of the year, attendance, IQ, and experiences with minimum competency testing. School transcripts were collected in 1990 for youth who had been in secondary school at any time since the 1986-87 school year.
- ***School Program Survey.*** In 1987, schools attended by sample students in the 1986-87 school year were surveyed for information on enrollment, staffing, programs and related services offered to secondary special education students, policies affecting special education programs and students, and community resources for the disabled.
- ***Student School Program Survey.*** In 1990, this survey obtained information about youth who still were in secondary school. Respondents were teachers familiar with students' school programs. They reported about students' in-class performance, class size, school climate, and transition planning activities that had occurred for each student.
- ***Explanatory Substudies.*** Studies involving subsamples of youth in selected disability categories examined in greater depth students' secondary school programs, the patterns of transition outcomes achieved by youth who were out of secondary school, and the relationship between school experiences and outcomes. Data were collected for in-school youth in 1988 and 1989 and for out-of-school youth in 1989.

The NLTS Sample

The initial NLTS sample was constructed in two stages. A sample of 450 school districts was selected randomly from the universe of approximately 14,000 school districts serving secondary (grade 7 or above) students in special education,* which had been stratified by region of the country, a measure of district wealth involving the proportion of students in poverty (Orshansky percentile), and student enrollment. Because not enough districts agreed to participate, a replacement sample of 178 additional districts was selected. More than 80 state-supported special schools serving secondary-age deaf, blind, and deaf-blind students also were invited to participate in the study. A total of 303 school districts and 22 special schools agreed to have their students selected for the study.

Analysis of the potential bias of the district sample indicated virtually no systematic bias that would have an impact on study results when participating districts were compared to nonparticipants on several characteristics of the students served, participation in Vocational Rehabilitation programs, the extent of school-based and community resources for the disabled, the configuration of other education agencies serving district students, and metropolitan status (see Javitz, 1990 for more information on the LEA sample). The one exception was a significant underrepresentation of districts serving grades kindergarten through eight. Many of these districts did not consider themselves as secondary school districts, even though they served grades seven and eight, which are considered secondary grade levels. In addition, bias may exist on factors for which data were not available for such comparisons.

Students were selected from rosters compiled by districts, which were instructed to include all students in special education in the 1985-86 school year who were in grades 7 through 12 or whose birthdays were in 1972 or before, whether or not they were served within the district or outside the district (e.g., in state-supported residential schools). Rosters were stratified into 3 age groups (13 to 15, 16 to 18, over 18) for each of the 11 federal special education disability categories and youth were randomly selected from each age/disability group so that approximately 800 to 1,000 students were selected in each disability category (with the exception of deaf-blind, for which fewer than 100 students were served in the districts and schools included in the sample).

In part because of the time lapse between sample selection and data collection, many students could not be located at the addresses or telephone numbers provided by the schools. Of the 12,833 students selected for the sample, about one-third could not be reached by telephone for the 1987 parent interview. (For more than half of these, addresses and telephone

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* The 1983 Quality Education Data, Inc. (QED) database was used to construct the sampling frame. QED is a private nonprofit firm located in Denver, Colorado. Special education cooperatives and other special service units were not sampled directly (83% of special education students are served directly by school districts; Moore et al., 1988). However, instructions to districts for compiling student rosters asked districts to include on their listing any students sent from their district to such cooperatives or special service units. Despite these instructions, some districts may have underreported students served outside the district.

numbers were not provided by the schools/districts from which they were sampled.) This relatively high rate of inability to reach sample members confirmed the importance of including in the NLTS a substudy of nonrespondents to determine whether those who were reached for the telephone interview were a representative sample of the population to which the study was intended to generalize. To identify whether bias existed in the interview sample, interviewers went to 28 school districts with relatively high nonresponse rates to locate and interview in person those who could not be reached by telephone. Of the 554 sought for in-person interviews, 442 were found and interviewed, a response rate of 80%. A comparison of telephone interview respondents with in-person interview respondents showed that the telephone sample underrepresented lower-income households. The sample was reweighted to adjust for that bias, as described in the next section.

Two samples will be used for this investigation. The main sample on which most of the analysis will be based, includes between 2,000 and 3,000 youth from all disability categories who:

- Were ages 13 to 21 and students in special education in secondary schools in the 1985-86 school year.
- Were in secondary school in 1987 during the first wave of NLTS data collection and were out of secondary school in 1990 when the second wave of NLTS data collection took place. Hence, the sample includes youth out of school up to 3 years in 1990, a period of time in which school influences on transition are likely to be strongest.
- Were not living in institutions in 1987 or 1990.
- Had data on their secondary school programs (a transcript or school program content form). A school record abstract from 1987 is an insufficient source of school program data because it covered only one year and data on the entire school program are needed for this investigation.
- Had both a parent interview from 1987 and a parent/youth interview from 1990. Data from both time periods are needed because outcomes are measured in 1990, whereas several lagged variables included in the analyses are from when youth were in school (1987).

The second sample is a much smaller subset of the first. This sample includes youth from the main sample who were:

- 12th-grade or ungraded students
- Classified as learning disabled, speech impaired, emotionally disturbed, or mildly or moderately mental retardation.
- Exiters from secondary school in the 1988-89 or 1989-90 school years (no dropouts are included).

These youth were weighted to represent all youth enrolled in special education in the 1985-86 school year who had left secondary school by September 1987.

Weighting Procedures and the Population to Which Data Generalize

Youth with disabilities for whom data could be gathered were weighted to represent the U.S. population of students in special education in the 1985-86 school year who were in grades 7 through 12 or at least 13 years old. Because it is a sample of students at various ages, the NLTS sample does not generalize to youth who had dropped out of school before that age. For example, the sample of 18-year-olds generalizes to youth who were 18 and still in secondary school in 1985-86, not to all 18-year-olds with disabilities, many of whom may had left school at an earlier age.

In performing sample weighting for wave 1 (1987), three mutually exclusive groups of sample members were distinguished:

(A) Youth whose parents responded to the telephone interview.

(B) Youth whose parents did not respond to the telephone interview but were interviewed in person.

(C) Youth whose parents did not respond to either the telephone or in-person interviews but for whom we obtained a record abstract.

A major concern in weighting was to determine whether there was a nonresponse bias and to calculate the weights in such a way as to minimize that bias. There was a potential for three types of nonresponse bias:*

(1) Bias attributable to the inability to locate respondents because they had moved or had nonworking telephone numbers.

(2) Bias attributable to refusal to complete an interview (only 3% of those available to be interviewed refused).

(3) Bias attributable to circumstances that made it infeasible to locate or process a student's school record.

Of these three types of nonresponse, the first was believed to be the most frequent and to have the greatest influence on the analysis. Type 1 bias also was the only type of nonresponse that could be estimated and corrected.

The magnitude of type 1 nonresponse bias was estimated by comparing responses to items available for the three groups of respondents (after adjusting for differences in the frequency with which youth in different disability categories were selected and differences in the size of the LEAs selected). Group A was wealthier, more highly educated, and less likely to be minority

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* We assumed that nonrespondents who could not be located because LEAs did not provide student names would have chosen to participate at about the same rate as parents in districts in which youth could be identified. The remaining nonrespondents would presumably have been distributed between the three types of nonresponse mentioned above.

than group B. In addition, group A was more likely to have students who graduated from high school than groups B or C (which had similar dropout rates). Groups A and B were compared on several additional measures for which data were unavailable for group C. The youth described by the two groups were similar on these additional items, including gender, employment status, pay, functional skills, association with a social group, and length of time since leaving school. Adjusting sample weights to eliminate bias in the income distribution eliminated bias in parental educational attainment and ethnic composition, but did not affect differences in dropout rates. Groups B and C were large enough that if they were treated the same as group A in the weighting process, the resulting dropout distribution would be approximately correct.

Sample weighting involved the following steps:

- Data from the first groups of sample members were used to estimate the income distribution for each disability category that would have been obtained in the absence of type 1 nonresponse bias.
- Respondents from all three groups were combined and weighted up to the universe by disability category. Weights were computed within strata used to select the sample (i.e., LEA size and wealth, student disability category and age).
- Weights from three low-incidence disability categories (deaf, orthopedically impaired, and visually impaired) were adjusted to increase the effective sample size. These adjustments consisted primarily of slightly increasing the weights of students in larger LEAs and decreasing the weights of students in smaller LEAs. Responses before and after these weighting adjustments were nearly identical. In addition, the three deaf/blind youth from medium-size or smaller districts, who had large weights, were removed from the sample to increase the effective sample size. Thus, NLTS results do not represent the very small number of deaf/blind students in medium-size or smaller LEAs.
- The resulting weights were adjusted so that each disability category exhibited the appropriate income distribution estimated in step 1 above. These adjustments were modest (relative to the range of weights within disability category); the weights of the poorest respondents were multiplied by a factor of approximately 1.6 and the weights of the wealthiest respondents were multiplied by a factor of approximately .7.

Because analyses of postschool outcomes included 1990 data for only a subset of youth, new weights were needed for 1990 data. The first step in weighting the 1,990 out-of-school youth was to identify a group of 3,046 youth who had been enrolled in special education in the 1985-86 school year, who had left secondary school by September 1987, and for whom we had sufficient data so that these youth had been given a weight in the wave 1 analysis. (This did not require that the parent of the youth complete a parent/guardian interview; having a school record abstract was sufficient to receive a wave 1 weight.) Use of this wave 1 weight allowed the results for these 3,046 youth to be projected to the corresponding national population (that is, youth who were enrolled in special education in secondary school in 1985-86 and who had left secondary school by September 1987).

The second step in weighting was to use the group of 3,046 youth and their wave 1 weights to calculate distributions of the following:

- ***Age***—The primary categories were 15 to 17 years, individual years of age from 18 to 22, and a combined category of 23 and above.
- ***Ethnic background***—The primary categories were black; white; Hispanic; and a combined category for Indian/Alaskan, Asian/Pacific Islander; and other. In addition there was a category for "don't know" or refusals, and a category for missing (typically because the data collection instrument that was completed for youth did not ask for this information).
- ***School completion status***—The primary categories were graduated, aged out, and a combined category of dropped out, suspended, or expelled. In addition there was a category for "don't know" or "plans to return to school."
- ***Gender***.
- ***Household income in 1986*** (or 1990 if 1986 data was not available). The primary categories were under $12,000; $12,000 to $19,999; $20,000 to $24,999; under $25,000 but otherwise unspecified; $25,000 to $37,999; $38,000 to $50,000; and over $50,000. Those with incomes of $25,000 or over but otherwise unspecified were grouped with those with household incomes between $25,000 and $37,999. In addition there was a category for those with missing information and a category for those who responded "don't know," refused to answer, or indicated that the youth was institutionalized.

The third step was the use of a weighting program to calculate weights for the 1,990 youth so that they matched the demographic distributions of the 3,046 youth. The weighting was accomplished using Deming's algorithm, which iteratively modified the wave 1 weights for the 1,990 youth until they generated demographic marginals that were very similar to those obtained using the 3,046 youth. Each disability class was weighted separately and in general the demographic marginals were matched within a fraction of 1 percent. (Only for the deaf/blind, where sample sizes were very small, did any marginals fail to match within 1 percent, and here they differed no more than 2%.)

Estimation of Standard Errors

The NLTS stratified cluster sample introduces design effects that reduce the precision of estimates for a sample of a given size, compared with a simple random sample. The design effects within the NLTS affect the precision of estimates to varying degrees for different subpopulations and different variables. Pseudo-replication is widely accepted as a variance estimation technique in the presence of design effects. However, it is not cost-effective for estimating the standard errors of the thousands of variables and subpopulations tabulated in the numerous NLTS reports and its statistical almanacs. Therefore, pseudo-replication was conducted on a limited number of variables to calibrate a cost-effective approximation formula, using the following procedures:

- A set of 25 variables representing the parent interview, school program survey, and record abstract was identified for the purpose of developing a statistical approximation formula; these included 16 nominal variables and 9 continuous variables.

National Longitudinal Transition Study of Special Education Students

National Longitudinal Transition Study

Reports and Papers Based on the NLTS

Papers available:

- "What Happens Next? Trends in Postschool Outcomes of Youth with Disabilities." M. Wagner, R. D'Amico, C. Marder, L. Newman, and J. Blackorby, 1992. 328 pp. $32.00. [Order No. 166]

- "Youth Classified as Seriously Emotionally Disturbed: How Well Are They Being Served?" C. Marder, 1992. 25 pp. $10.00. [Order No. 158]

- "Hispanic Secondary School Students with Disabilities: How Are They Doing?" L. Newman, 1992. 35 pp. $10.00. [Order No. 157]

- "Being Female—A Secondary Disability? Gender Differences in the Transition Experiences of Young People with Disabilities." M. Wagner, 1992. 50 pp. $10.00. [Order No. 156]

- "The Early Work Experiences of Youth with Disabilities: Trends in Employment Rates and Job Characteristics." R. D'Amico and C. Marder, 1991. 56 pp. $15.00. [Order No. 147]

- "Dropouts with Disabilities: What Do We Know? What Can We Do?" M. Wagner, 1991. 80 pp. $15.00. [Order No. 146]

- "How Well Are Youth with Disabilities Really Doing? A Comparison of Youth with Disabilities and Youth in General." C. Marder, March 1992. 92 pp. $15.00. [Order No. 144]

- "Youth with Disabilities: How Are They Doing? The First Comprehensive Report from the National Longitudinal Transition Study of Special Education Students." M. Wagner et al. 1991. 600 pp. $40.00. [Order No. 135]

- "Parents' Reports of Students' Involvement with Vocational Rehabilitation Agencies in the First Years After Secondary School." M. Wagner and R. Cox, 1991. 50 pp. $12.00. [Order No. 134]

- "The Relationship Between Social Activities and School Performance for Secondary Students with Learning Disabilities." L. Newman, 1991. 52 pp. $10.00. [Order No. 133]

- "The Benefits Associated with Secondary Vocational Education for Young People with Disabilities." M. Wagner, 1991. 66 pp. $10.00. [Order No. 132]

- "The National Longitudinal Transition Study of Special Education Students: Report on Sample Design and Limitations, Wave 1 (1987)." H. Javitz and M. Wagner, 1990. 71 pp. $18.00. [Order No. 131]

- "The National Longitudinal Transition Study of Special Education Students: Report on Procedures for the First Wave of Data Collection (1987)." M. Wagner, L. Newman, and D. Shaver, 1989 (includes data collection instruments). 280 pp. $25.00. [Order No. 126]

- "The National Longitudinal Transition Study of Special Education Students: Report on Procedures for the Second Wave of Data Collection (1990)." C. Marder, K. Habina, and N. Prince, 1992 (includes data collection instruments). 220 pp. $20.00. [Order No. 165]

- "The School Programs and School Performance of Secondary Students Classified as Learning Disabled: Findings from the National Longitudinal Transition Study of Special Education Students." M. Wagner, 1990. 27 pp. $10.00 [Order No. 125]

• "The Transition Experiences of Youth with Disabilities: A Report from the National Longitudinal Transition Study." M. Wagner, 1989. 42 pp. $10.00. [Order No. 118]

• "Making the Transition: An Explanatory Model of Special Education Students' Participation in Postsecondary Education." P. Butler-Nalin, C. Marder, and D. Shaver, 1989. 41 pp. $10.00. [Order No. 117]

• "Educational Programs and Achievements of Secondary Special Education Students: Findings from the National Longitudinal Transition Study." M. Wagner and D. Shaver, 1989. 41 pp. $10.00. [Order No. 116]

• "Dropouts: The Relationship of Student Characteristics, Behaviors, and Performance for Special Education Students." P. Butler-Nalin and C. Padilla, 1989. 41 pp. $10.00. [Order No. 115]

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